COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1959, No. 36

GEOPHYSICAL SURVEY OF THE GREAT LYELL, EAST DARWIN AND COMSTOCK AREAS, QUEENSTOWN, TASMANIA

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ABSTRACT

Geophysical surveys, using mainly electromagnetic methods, have been performed over the Great Lyell, East Darwin and Comstock areas, at the request of the Mt.Lyell Mining and Railway Company.

Two anomalies were located in the Great Lyell area, which are considered to be due to sulphide mineralisation. Although the anomalies are weak, they occur in a position considered to be geologically favorable, and recommendations are made for testing by diamond drilling.

Three weak anomalies were located at East Darwin. They are considered to be due to sulphide mineralisation, which has been adequately tested by previous workings. No further testing is recommended.

In the Comstock area, two strong anomalies were located. One corresponds in position with the known copper lode, and one with the known lead lode. The results indicate that these lodes may be of considerable length and recommendations are made for testing by diamond drilling. Two smaller indications are present, which are considered to be due to mineralisation which has been tested by previous drill holes.

1. INTRODUCTION

At the request of the Mt.Lyell Mining and Railway Co. Ltd., geophysical surveys were performed by the Bureau over the following areas near Queenstown, Tasmania:-

Glen Lyell
Corridor
Great Lyell
East Darwin
Comstock

The surveys over the Glen Lyell and Corridor areas were performed during 1956, and were described in a previous report (Rowston 1957). The surveys over the remaining three areas were carried out between the 3rd January and 18th April, 1957, and the results are the subject of the present report. The location of the various areas is shown on Plates 1 and 2, with the exception of East Darwin which is a considerable distance from Queenstown and is shown only on Plate 1.

The Bureau party consisted of D.L. Rowston and M.B. McGirr, geophysicists, and two University vacation students. During the later part of the survey, field assistants were provided by the Company. The Company also organized a camp in the East Darwin area. Surveying was performed by an officer of the Department of the Interior.

The Great Lyell and East Darwin areas are extremely rough and inaccessible by normal modes of transport. Staff and equipment were carried to these areas by helicopter.

2. GEOPHYSICAL METHODS USED DURING THE SURVEY

The geophysical methods used during the 1957 survey were the same as those employed in the previous year with the exception that no soil samples were taken for geochemical analyses. It was found that the geochemical technique was ineffective because of the lack of adequate soil cover and the steep terrain of the Mt.Lyell area.

The electromagnetic, magnetic and self-potential methods were used; each method is fully described by Rowston (1957), and only a brief summary is given here.

The electromagnetic Turam method entails the measurement of the vertical components of an applied electromagnetic field. A primary alternating-current field is established in the area of investigation by means of an audio-frequency generator connected in series with a long, straight, insulated cable earthed at each end. The distribution of the primary field over a homogeneous medium can be calculated. When variations in the electrical characteristics of sub-surface features occur within the limits of the field, secondary induced fields arise, which combine with the primary field. By measuring the resultant vector at the surface of the ground and allowing for the effects of the primary field, the remaining variations are an indication of the sub-surface conductivity. Variations of reasonable magnitude are termed anomalies or indications and may be attributed to geological features. Turam equipment No.14 was used for the Mt.Lyell investigations.

Natural earth potentials are generated by a sulphide ore body undergoing active oxidation at the ground-water table. The electrochemical currents flowing through the ore body give rise to a potential distribution which can be measured at the ground surface. A negative anomaly usually occurs directly above a sulphide ore body. At Mt.Lyell, the known mineralised zones were surveyed using an S.P. meter, Type E, No. 9094.

Magnetic observations are made to detect local variations in the vertical component of the earth's magnetic field. The variations are due to concentrations of magnetic minerals and may be a useful aid in the interpretation of the geology. The instrument employed was a Watts vertical variometer No.69107.

3. GREAT LYELL AREA

A. Introduction

The Great Lyell area is situated in a dissected basin at the western foot of Mt.Owen and is about two miles east of Queenstown. The basin is bounded to the north by the Lyell Highway, and on the south by the slopes of Mt.Owen and Little Mt.Owen. The topography is typical of the youthful erosion stage associated with the Owen Conglomerates and is due to the drainage of two north-flowing streams, Conglomerate and South Owen Creeks, and their tributaries. At the junction of the creeks, there is a gravel covered flat surrounded on all sides by very steep slopes. Most of the area has only sparse vegetation, but there are patches of dense scrub in the south-eastern section.

There is no vehicle access into the surveyed area and the easiest means of entry is down the steep embankments of the Lyell Highway.

B. Mining History and Geology.

A geological map of the Great Lyell Area is shown on Plate 3B.

Most of the basin had been carefully prospected by 1900, and by 1903 a group of workings, comprising the Copper Estates, Great Lyell and Duke Lyell, was opened. Little production is recorded from these workings and little exploration was carried out from the time these operations ceased until 1937, when Douglas examined the area. His findings were not encouraging and they were confirmed by the dump sample assays and detailed surface mapping completed by the Company geologists in 1954 (Wade, 1954). The geologists recommended that any further investigations in the area be preceded by geophysical surveys.

The area is composed of rocks of the Cambrian Dundas Group which have a general north-westerly strike and north-easterly dip and are conformable with the younger West Coast Range conglomerates in the east. The sediments of the Dundas Group, which consist of slates, sandstones, greywackes, etc., have not been subjected here to the same intense shearing and degree of over-turning as experienced at Mt.Lyell. The N60°W fold system predominates and, because there are no intersections of this system with the N20°W fold axes, there is no great development of sericitic and chloritic schists or intrusive porphyries (Wade, 1954).

Surface outcrops indicate that the mineralisation is less widespread and weaker than that at West Lyell (Wade, 1954). Two main zones of sulphide mineralisation occur in favourable beds in the sheared Dundas rocks.

One of these occurs along the southern end of the South Owen fault (Plate 3B) in a sheared and partially chloritised sandstone. The zone extends from north of the Great Lyell Shaft to the Duke Lyell adits and is flanked by a conglomerate spur to the east and a blocky Cambrian sandstone to the west. Because of the favourable contact environment this is the most interesting prospect in the Great Lyell area.

The other mineralised zone is an irregular band along the eastern slopes of Little Mt. Owen. It is centred on the Great Lyell adits and is found in a sheared chloritic bed between tuffs and sandstones of the Dundas Group sediments. The mineralisation occurs where an intrusive porphyry is interfingered with sediments. A similar porphyry is found near the Duke Lyell adits.

The object of the geophysical survey was to delineate the mineralised areas at Great Lyell, especially over the river gravel section where rock exposures are confined to the Great Lyell Shaft.

C. Geophysical Operations.

Geophysical operations during the 1957 season commenced in the Great Lyell area, where no geophysical work had previously been attempted. The problem of transporting the heavier equipment into the locality was simplified by use of the Bristol helicopter. The instruments were flown direct from the heliport to the site, the whole operation taking only a few minutes and minimising the risk of damage to the instruments and injury to personnel on the treacherous slopes.

An area about 3,000 feet by 2,000 feet was considered sufficient to cover the favorable area. Complete coverage of this area, however, was impossible because of the steep slopes. The geophysical grid and its relation to the Mt.Lyell mine survey grid, are shown on Plate 3A. Stations were pegged generally at 25 foot intervals.

Test surveys using the three methods, electromagnetic, magnetic and self potential, were carried out along traverses 24 and 26 over known mineralisation. Comparison of the Turam profiles for the two available frequencies 440 c.p.s. and 880 c.p.s. showed that the 880 c.p.s. frequency with a constant coil separation of 100 feet gave the better results and this frequency and coil separation were adopted for the remainder of the survey. The primary cable was initially laid along 3000 to investigate the portions of the traverses from 2850 to 1700. On completion of the survey of this portion of the area, the cable was relaid along baseline 2000 and the remainder of the layout surveyed.

Magnetic observations were made over the whole area, readings being taken at 25 or 50-foot intervals.

Conditions for the self-potential survey were similar to those experienced in the Glen Lyell area in that fluctuations from the electric train at West Lyell influenced the natural earth potentials. Measurements on traverses 22 to 32 failed to disclose significant variations and the method was therefore discontinued.

D. Results and Interpretation

The geophysical results obtained in the Great Lyell area are shown on Plates 3B to 3E. Plate 3B shows the geophysical grid and the geophysical indications superimposed on the geological map. Plate 3C shows the Turam phase contours, 3D the magnetic contours and 3E the terrain, Turam phase and magnetic profiles along Traverse 22.

The magnetic and Turam methods were successful in locating several indications which are related to the presence of paramagnetic minerals and to zones of higher electrical conductivity respectively.

(i) Electromagnetic (Turam) results.

The best correlation between the geophysical and geological data is apparent in the Turam results, particularly with regard to the sulphide mineralisation. The electromagnetic indications are present only in the phase differences; the ratio profiles show no significant maxima that may be used in interpretation. According to Hedstrom (1940), the fact that the indication shows mainly in the phase difference and is virtually non-existent in the intensity ratio indicates that the body causing the anomaly is one of relatively low conductivity. This condition was found also in the previous Turam surveys at Mt.Lyell and is attributed to the fact that the sulphides are not massive but are disseminated in an insulating siliceous gangue. Under such circumstances, phase indications predominate.

Although the indications are relatively weak, they are distinct and form a continuous zone through the centre of the surveyed area. There are no other phase difference variations that could be classed as indications; the minor differences in conductivity which occur in other parts of the area are probably related to the different types of sediments, e.g. the Miners Slate has a higher resistivity than the adjacent sandstones and tuffs.

The main indications are located over the mineralized zone which includes the Great Lyell Shaft, the Duke Lyell adits and other smaller workings along the western slope of the conglomerate spur. These indications may be conveniently divided into two groups separated by a discontinuity perhaps caused by a fault. The groups are designated Anomaly 56/57 and Anomaly 57/57.

Although the rugged terrain prevented geophysical investigation of the area between the Glen Lyell and Great Lyell grids it is considered that Anomalies 51/56 56/57 and 57/57 are associated with the single mineralized zone mapped by Nye in 1934.

Anomaly 56/57 strikes north-westerly and extends over a distance of about 800 feet, between traverses 18 and 26. It is composed of three indications, one of which is the isolated lens near 1900 on traverses 20 and 22. The strongest and most persistent indication of the group forms the eastern side of the anomaly and combines on traverse 24 with a less pronounced parallel indication (Plate 3C). The higher conductivity observed in this zone is attributed to narrow near-vertical bands of sulphides disseminated in the Dundas sediments. The Great Lyell shaft, which is situated on the eastern margin of the strong indication, intersected a 60-foot width of mineralisation in the 60-foot level cross cut. The sulphides continue in a green chloritic schist to a depth of at least 168 feet. Assay values of 3.0 per cent copper were reported from the mine but these have not been confirmed by more recent sampling; assays made by the Company on recent dump samples average only 0.7 per cent copper. Anomaly 56/57 widens on traverse 24 and terminates abruptly near traverse 26. The discontinuity between this anomaly and anomaly 57/57 at the nose of the conglomerate spur suggests a cross-fault. The electromagnetic results show slightly increased phase differences on these traverses; this is in agreement with the Mt.Lyell criteria that ore-shoots are usually associated with intersections of fold axes. Conolly (1953) shows this area as the intersection zone of the South Owen Fault (striking NNW) and the Copper Estates fold axis, striking north. Geophysical evidence, however, indicates the feature as striking north-westerly. The thick mantle of river gravel prevents geological mapping in this area.

The other well-defined anomaly, number 57/57, commences on traverse 26 and strikes south-easterly along the western slopes of the conglomerate spur as far as traverse 38, where it divides into two weaker branches. The eastern branch forms the extension of the main indication and, although weaker, continues to the Duke Lyell adit on traverse 42. The indication is extremely weak southwards from traverse 42. The mineralised outcrop surrounding the Duke Lyell adit (Plate 3B) lies to the east of the very weak geophysical indication.

The phase profiles indicate that Anomaly 57/57 is associated with a shallow, near-vertical, narrow body which has a maximum conductivity near 2075 on traverses 26 and 30. It is considered that the indication is due to sulphide mineralization in the sheared rocks.

No indication of even slightly higher conductivity was obtained in the mineralized zone near 1000 on traverse 20, where the Great Lyell adits are situated. As the phase differences in a Turam survey are sensitive to relatively slight conductivity variations, the absence of a phase anomaly seems to indicate that no widespread mineralization can be expected, but only sporadic occurrences without substantial reserves.

(ii) Magnetic results.

Several magnetic anomalies, small in both magnitude and extent, were observed in the Great Lyell area. These are shown in the magnetic contour map on Plate 3D. Most of the magnetic "highs" are of the order of 200 gammas and have regular, lenticular, configurations which are generally elongated in the direction of the schistosity. The higher values of magnetic susceptibility associated with these anomalies are attributed to various forms of accessory iron minerals in the Dundas sediments. Although some of the magnetic anomalies coincide with the mineralized zones and electromagnetic indications, no definite spatial relationship between iron mineral concentrations and mineralization can be established. Some of the anomalies, such as those in the southern portion of the grid, are associated with quartz reefs or blows containing micaceous hematite, whilst others are probably associated with hematite irregularly distributed in the sediments. For example, in the magnetically high area bounded by the 50-gamma contour to the east of the Great Lyell shaft, the schists have a typical limonitic discolouration which is presumably derived from iron oxides rather than from pyrite and pyrrhotite mineralization.

E. Conclusions and Recommendations.

The only geophysical indications that can be attributed with reasonable certainty to sulphide mineralization are those obtained by the electromagnetic survey. The observed magnetic anomalies have no definite association with mineralization and must be due to concentrations of magnetic minerals in the sediments and quartz blows.

Turam Anomalies 56/57 and 57/57, although weak by comparison with the Corridor indications obtained in 1956, warrant further investigation. Anomaly 56/57 is considered to be the more important because of its more favourable geological position.

Plate 3E shows the geophysical profiles along traverse 22, and the recommended sites for two diamond drill holes are indicated. The recommended sites are both at 2,000 on traverse 22 and the holes should be drilled in the direction of the traverse. One hole, drilled towards the north-east at a depression of 50 degrees and about 600 feet in length, should be sufficient to test the mineralisation. A second hole, drilled towards the south-west at an angle of depression of 50° and about 350 feet deep, would test the smaller geophysical anomaly centred at 1850. Any further exploration of the zone should be based on the results obtained from these two holes.

Anomaly 57/57 can be superficially tested by examining the existing workings along the western slope of the conglomerate spur. This anomaly could be tested at depth by several holes (perhaps starting with one at 1900 on traverse 30) depressed at 50°, to reach the mineralized zone at about 150 ft. The area to the west of the spur is very dissected, however, and the transport of drilling equipment will be difficult.

4. EAST DARWIN AREA.

A. Introduction.

The East Darwin area is located on the steep eastern slopes of Snake Peak, which is about 1½ miles north of Mt.Darwin and 12 miles south-south-east of Queenstown (see Inset, Plate 1). Access to the area is by a vehicle track along the old Kelly Basin railway line to the Darwin town site, and from there by pack track up to the peak. It takes about two hours to travel the 20 miles by road, whereas the direct air route from Queenstown occupies only ten minutes by helicopter.

The area has the characteristic topography of the West Coast Range Conglomerates, but in spite of its rugged nature proved to be suitable for geophysical work. Most of the area surveyed has an average slope of 25 degrees, and rises to the foot of the conglomerate cliffs surrounding the peak. Patches of dense bauera scrub and the heavily-timbered sides of the Allan Creek ravine were the worst hazards.

B. Mining History and Geology.

Mining activity in the locality commenced in 1897 and continued until the Crotty smelters closed in 1903. As a result of this prospecting activity several adits were driven into the mineralised zones at East Darwin but, although some of them are still accessible, the workings are covered by a thick limonitic slime, which obscures the lode material. Douglas sampled the adits in 1940 and a further examination of the copper prospects was made by Company geologists in 1955. The recommendation resulting from the 1955 geological survey was that further investigations be made using geophysical techniques.

The stratigraphic sequence and rock types are similar to those in the Mt.Lyell area, but the shearing and N60°W repetition folding are not as pronounced. The sheared Cambrian sediments are overlain by Ordovician (Owen) conglomerates and limestones which are in turn overlain by Silurian shales and quartzites. The dominant structure is a local syncline pitching north-west which is cut off in the south-east by a steeply dipping fault. The fault strikes N10°W and dips at 80° to the west. As a result of the movement, the schists to the east have been upthrown several hundred feet. Surface sulphide mineralization containing some copper extends in sheared rocks for about 2,500 feet in a narrow north-south zone along the Lyell Shear. Chloritisation and secondary silicification of the schists are well advanced.

The most favourable environment for mineralisation is along the contact fault; Souter's workings disclose blocky chalcopyrite in pyrite at the contact. Elsewhere, pyrite is finely disseminated in highly siliceous chloritic schist along the conglomerate contact. Hematite occurs in blebs and stringers along the schistosity planes but does not appear to be admixed with the pyrite. The assay values of samples taken by Douglas do not agree with the high values mentioned in earlier reports (Hills, 1914). In Souter's workings, the assays over the best five-foot to ten-foot section show a maximum of 1.17 per cent copper, The sampling omitted the random lumps of blocky chalcopyrite which assay between 20 and 36 per cent copper.

Dillon's No.1 Tunnel, sampled in 5-foot sections, showed 1.71 per cent copper between 175 and 180 feet from the portal, but the remainder of the tunnel between 90 and 190 feet averaged only 0.3 per cent copper. In Pearce's workings, the last 60 feet of the main adit averaged 0.15 per cent copper and the north drive in mineralization only 0.2 per cent over the 70 feet sampled.

C. Geophysical Operations

The East Darwin survey was made over a strip of ground about 1200 feet wide, from Camp Creek in the north to Souter's workings on the edge of the Allen Creek ravine, a distance of about 2,400 feet (see Plate 4A). During the survey, the party camped on the site. The Bristol helicopter was used to transport the geophysical and camping equipment from the old Darwin town site to the area and, when available, to deliver supplies.

Initially, a grid baseline, 800W, was laid on a true bearing of 345° 12'. Traverses at 200-foot intervals and at right angles to the baseline were pegged where possible every 25 feet from 300W to 1500W. Because of thick bauera scrub and dense timber in the east and south, some traverses were limited to the essential sections determined by the geophysical results. The grid is shown on Plate 4A with traverses from 200N to 2200S. The relationship of the geophysical grid to the earlier plane-table survey made by the Company in 1955 is also shown.

Electromagnetic (Turam), self-potential and magnetic methods were employed. A frequency of 880 cycles per second and 100-foot coil separation were selected for the Turam technique after examination of the profiles obtained using 440 and 880 cycles per second on test traverses 800S and 1000S. The self-potential survey was unsuccessful; the readings were somewhat erratic due to poor contact conditions caused by a peaty surface layer, and no significant indications were disclosed. Vertical magnetic force observations were made on traverses 200N to 1600S, but the remaining three traverses were omitted because of the lack of significant variations on the adjacent traverses and the difficulties experienced in setting up the instrument in the tangled undergrowth.

D. Results and Interpretation.

Geophysical indications were obtained by both the electromagnetic and magnetic methods and are shown on Plates 4A and 4B. Plate 4A shows the geophysical grid and the electromagnetic and magnetic indications, the topographic features and contours, and the East Darwin workings; Plate 4B shows the Turam phase contours.

It is considered that the Turam results reveal the extent of the sulphide mineralisation, and that the magnetic variations are associated with patchy hematite occurrences adjacent to the sulphide zones.

Three indications were delineated by the Turam method; they are apparent only in the phase-difference readings. Consequently, the indications represent zones of moderate to low conductivity but nevertheless are well defined. All the electromagnetic indications occur over highly silicified schists containing disseminated pyrite and are ascribed to the higher conductivity of the sulphides.

The three indications are designated Anomalies 1, 2 and 3 on Plate 4B.

Anomaly No.1 is located over Souter's section and is a very limited lenticular anomaly about 200 feet long. The anomaly is elongated parallel to the schistosity, and is associated with either the sulphide mineralization or the contact fault. Electromagnetic anomalies are frequently associated with shears but in this instance there is no extension northwards beyond 1900S to correspond with the mapped continuation of the fault zone. Moreover, the areal extent of the anomaly agrees with the mineralised area exposed in Souter's adits, and the sulphides are therefore considered to be the most likely cause of the anomaly.

The indication is very weak on traverse 2200S and because of dense vegetation and the lack of geophysical evidence suggesting a continuation southwards, further investigations in that direction were not considered to be warranted. The main adit and drive along the contact in Souter's workings did not intersect payable mineralization.

Anomaly No.2 is the strongest of the electromagnetic indications obtained in the area. The phase difference contours show a narrow lenticular anomaly about 700 feet long which has its maximum value at 825W on traverse 1400S. The indication arises from a near-surface source with its southern limit near 1600S and extending with a northerly strike and increasing depth to 1000S. Geological mapping revealed that the local structure is a north-pitching syncline and further confirmation of the pitch is obtained from the different levels of Dillon's and Pearce's workings.

Dillon's No.1 tunnel, below the maximum of the phase indication, is at a depth of 100 feet and shows pyrite in a siliceous chloritic schist. A similar body is exposed in Pearce's adit below the northern end of the anomaly. The underground workings are shown on Plate 4B in relation to the geophysical indications. Pearce's tunnel investigated mainly the northern end of the anomaly and did not extend far enough to test the southern end.

North of Anomaly No.2, the Turam results show no well defined anomaly but a slight increase in conductivity.

Anomaly No.3 is a weak indication which is also attributed to pyrite mineralization. Several costeans in the locality show pyrite.

Results of the magnetic survey show a general magnetic high to the west of the base line, with two closures of over 300 gammas, which are shown on Plate 4A. The anomalies bear no obvious relation to the electromagnetic anomalies, and there is no reason to suppose that they have any connection with sulphide mineralization. They are probably due to accessory iron oxide minerals, occurring as blebs and stringers along the schistosity planes of the sheared sediments.

E. Conclusions and Recommendations.

The geophysical anomalies located at East Darwin by the Turam and magnetic methods are attributed to sulphide mineralization and hematite respectively. The concentrations of magnetic minerals are distinct from the sulphides and seem to have no commercial significance. Three indications were obtained by the electromagnetic technique and these outline the extent of the mineralization in the area. Two of the indications, Anomalies 1 and 3, suggest that the sulphides associated with them are very limited in extent. Anomaly No.1, over Souter's workings, indicates that, although the geological environment is favourable, the patchy mineralization is restricted to the immediate vicinity of the adits and is unlikely to extend further south. In the light of Douglas' assays of samples from Souter's adits it is considered that further examination of Anomaly No.1 is unnecessary.

The strongest indication in the area, Anomaly No.2, has been intersected at depth by Pearce's and Dillon's adits, which show that the disseminated sulphides to which the indication is attributed are about 80 feet wide. The geophysical results indicate that the ore body is about 700 feet long. Pearce's adit has not been extended far enough to the south to examine the strongest part of the indication. If the assay results in the known sections are not too discouraging, it is recommended that the south drive of Pearce's adit be extended for another 250 feet to determine whether the copper values improve. However, the systematic sampling carried out by Douglas in 1940 is perhaps adequate for an assessment of the indication.

As there are no other geophysical anomalies that can be correlated with mineralization, no further recommendations are made for testing the area.

5. COMSTOCK AREA.

A. Locality and Geology.

The third area investigated during the 1957 season, the Comstock, is situated in the Sedgwick Valley about four miles north-north-east of Queenstown on the north-western slopes of Mt.Lyell. The geophysical survey was made over an area 3,000 feet by 2,000 feet, centred on the Old Comstock and Tasman workings (see Plate 5A).

Access to the area was facilitated by a narrow-gauge tram line following the circuitous eastern branch of the Queen River and Comstock Creek. Alternative entry to the area is by a foot track around the cliffs of Mt.Lyell.

The topography of the area ranges from the comparatively flat moraine terraces of the valley floor to the steep slopes under the conglomerate cliffs and breccia outlier. Much of the area is covered with dense low scrub and other parts are swampy.

The geological environment is similar to that at North Lyell. The sequence comprises the Cambrian Dundas Group sediments and volcanics and the Ordovician Owen Conglomerates. During the Devonian orogenesis, a zone of schistose rocks was developed from these sediments, ranging from coarse knobbly schists to fine chloritic and quartz-sericitic schists near the conglomerate contact. Relict sedimentary bedding and pebbles have been observed in several places and replacement of the conglomerates by schist is confined to favourable beds of the Upper and Middle Owen Series. The Dundas sediments are felspathised and kaolinised.

The major structures are the assymetrical Sedgwick Fault striking N60^{o}W and the Comstock Fault. As a result of the crushing of the rocks at the intersection of the two systems, highly siliceous breccias were formed in the crush zone. The breccias are somewhat cherty and contain hematite blebs and jasper bands.

The schistosity has a north-easterly trend over the Comstock Open Cut, and swings gradually to the east over the Tasman mine, following the conglomerate contact. Results of recent geological mapping of the Comstock area are shown on Plate 5A, which shows also the restrictions imposed on geological mapping by the glacial cover to the north and east of the Tasman shaft.

Sulphide mineralization (copper and lead) occurs in the schists in the Comstock fault zone.

The low-grade disseminated copper ore was worked in the Comstock open-cut and mine. Chalcopyrite is associated with pyrite impregnating the schists and narrow quartz seams. North-west of the Tasman shaft a lode capping containing some bornite was cut in the No.3 tunnel and other levels of the Tasman workings. The ore bodies are en echelon, one making in the footwall as another fades in the hanging wall.

The lead mineralization at Comstock is unique in the Lyell field and occurs as a lode which ranges in width between 5 feet and 30 feet. The ore is an intimate mixture of galena, sphalerite and pyrite, with little or no gangue. The tenor of the ore is variable, the galena usually predominating. Pyrite sometimes concentrates without galena or sphalerite but otherwise all three sulphides are admixed. Silver occurs with all three components and traces of gold are associated with the ore. The galena has the typical cubical habit and although usually fine-grained, it occurs in places in coarse crystalline form. The known ore body strikes easterly over a distance of about 300 feet at the 134-foot level of the Tasman mine and dips to the south (Nye, 1925).

Mining operations, which commenced in the early days of the Mt.Lyell field, continued spasmodically until 1942 when high transport and operating costs caused the cessation of work. It is reported that ore reserves total about 390,000 tons of 2.0 per cent copper ore.

B. Geophysical Operations.

The object of the geophysical survey was to locate anomalous zones north-east of the Comstock Open-cut and near the main breccia outlier.

Earlier geophysical investigations were made by Blazey and Douglas and their results were re-interpreted by Richardson (1949). A short test survey was made by the Bureau of Mineral Resources in 1955.

During the 1957 survey of the Comstock area all the field assistants and additional axemen were mine employees. The geophysical equipment and personnel were transported to Comstock on a small diesel locomotive provided by the company.

The layout of the geophysical grid is shown on Plate 5A. Sixteen traverses were surveyed at right angles to the baseline, 00. These were spaced at 200-foot intervals and numbered from -2 in the north-east to 28 in the south-west. The normal station interval of 25 feet was used and the pegging extended from the baseline in a south-easterly direction for distances up to 2,000 feet, depending on the terrain and the trend of the geophysical indications. Short sections of some intermediate traverses were surveyed where necessary. The true bearing of the baseline (55°30') was determined by sun observations. The relationship between the true and magnetic bearings and the mine and State Survey grids is shown on Plate 5A.

Some sections of the layout, mainly on traverses 12 to 18, had to be omitted because of the precipitous and dangerous nature of the ground around the Comstock open-cut and the breccia outlier.

Electromagnetic, magnetic and self-potential methods were used, but only the electromagnetic (Turam) method gave satisfactory results. The magnetic observations were adversely influenced by the large quantities of old iron, rails, mine skips etc. near the workings. The self-potential measurements were also unreliable because of local disturbances due to pyrite in the dumps and poor electrode contacts over the glacial debris. The magnetic and self-potential methods were discontinued after the initial testing.

In the initial testing of the electromagnetic method on traverse 8 it was found that the phase differences often exceeded the range of the instrument when using a frequency of 880 cycles per second. To eliminate repetition reading and change in coil spacing, the frequency was reduced to 440 cycles per second.

C. Results and Interpretation.

The only significant geophysical anomalies in the Comstock area were obtained by the Turam method, the results of which are shown on Plate 5B to 5D.

As in other surveys in the Mt.Lyell field, the indications obtained during the 1957 survey coincide in places with the equipotential anomalies of Blazey and Douglas. In such instances, the same anomaly numbers are used but are suffixed by the figure 57; e.g. equipotential Zone 30 (Indication E) corresponds to the Turam Anomaly 30/57. Geophysical indications obtained during the 1957 survey only are designated from Anomaly 32/57 onwards.

The electromagnetic anomalies are located in the schists between the Owen conglomerates and comparatively unaltered Dundas Group sediments and volcanics, and are generally elongated in the direction of the schistosity. The geophysical results show that the schists have slightly higher electrical conductivity than the conglomerates and Dundas Group rocks but that, within the boundaries of the schists, there are indications of even greater conductivity. It is considered that the equi-phase difference contour for -2 degrees on Plate 5C and the 1.05 ratio contour on Plate 5D outline the approximate boundary of the schists.

The main indications in the Comstock area, Anomalies 30/57 and 32/57, are situated to the north-east of the open-cut. Both the ratio and the phase components of the electromagnetic field show well pronounced anomalies which may reasonably be attributed to sulphide mineralization of parts of the schists. The strength of the Turam indications is probably indicative of the intensity of the mineralization and Anomalies 30/57 and 32/57 are similar to Anomalies 31/56 and 16/57 of the Corridor area (Rowston, 1957).

Anomaly 30/57 is the strongest indication in the Comstock area and is located to the north of the Tasman shaft. The Turam anomaly coincides with equipotential Zone 30 but is larger and is more sharply defined. The indication is about 700 feet in length and has an easterly strike; it commences at 800 on traverse 10 and continues as a well-defined feature to 1400 on traverse 4, where it merges into the normal conductivity of the schists.

This anomaly appears to be related to the main copper lode intersected in the No.1, No.2 and No.3 Tunnels of the Tasman and Crown Lyell Extended Mine as described by Nye (1925). Conolly's section A - A, and the Mt.Lyell Company's section 400W are shown on Plate 5E. D.D.H. No.2, from the main drive at RL1377, cut the south-western extremity of the body and assays over a 60-foot section of the hole averaged about 2.0 per cent copper, the intersection showing bornite and chalcopyrite with pyrite.

The maximum reduced ratio reading is 1.35, and indicates that the highest conductivity is to be found between traverses 6 and 8.

The geophysical anomaly is a short distance to the south of the position of the body on the 253' level - this is to be expected, as the body dips to the north and the anomaly is derived probably from a source nearer the surface than the intersections at the 253 ft.level. The north-eastern extremity of the body appears to terminate fairly abruptly. The profiles give no indication that the body pitches in that direction.

Summing up, the anomaly indicates a lenticular body which dips to the north and has no apparent pitch. The anomaly warrants further examination by diamond drilling.

The area to the west of Anomaly 30/57 is favourably situated geologically, but could not be surveyed because of the difficult terrain.

To the east of, and parallel to, Anomaly 30/57 the electromagnetic results indicate another highly-conductive section in the schists. This indication has been designated Anomaly 32/57.

Anomaly 32/57 is not as clearly defined as Anomaly 30/57; the phase difference and ratio contours show a narrow irregular indication which commences at 1800 on traverse 0 and continues through 1500 on traverse 6 and 1400 on traverse 8 to the Comstock open-cut. Investigation of the area between traverse 10 and the open-cut was limited to the two short traverses 8A and 8B on the lower benches of the open-cut; consequently the trend of the indication there has not been fully investigated. On traverse 8B, the electromagnetic field was distorted by rails from an adit but it is considered that the southern extremity of the geophysical anomaly is associated with the pyrite and galena lodes exposed in the face of the mullock cut. Other distortions of the field - evident mainly in the phase difference - may be noted at the portal of No.5 adit. These distortions are due to railway lines which resulted in phase minima at 600 on traverses 9 and 10. The two small minus 6 degree phase minima east of the Tasman shaft are due to railway tracks and a small mullock dump. The other anomalies are due to natural sub-surface features.

Anomaly 32/57 is outlined by both the ratio and phase measurements but the magnitude of the field components points to a feature with electrical characteristics different from those of Anomaly 30/57. Large phase differences combine with lower ratios, thus indicating that the feature has a lower conductivity than that associated with Anomaly 30/57 (Plate 5B). Such is the case with lead-zinc mineralization as compared with copper pyrite.

Anomaly 32/57 is attributed to mineralization and conforms with the location of the lead-silver-zinc lode described by Nye (1925). The position of the lode line at the 134-foot level is shown on Plates 5B, 5C and 5D. It passes to the east of the Tasman Shaft and has a general east-north-easterly trend. Nye records that the lead mineralization at the 134-foot level in the Tasman workings is about 300 feet long and from 5 to 30 feet wide. The dip of the lode ranges from northerly at the surface to southerly at and below the 134-foot level. There were no intersections with the lode below this drive and Nye considers that, if the lode persists in depth, it would pass to the south of the 253-foot level shown on Plate 5B.

The contours correlate well with the line of lode at the 134-foot level. It was recorded (Nye, 1925) that the lode had pinched out at the eastern end of the level and at this point the easterly pitch had steepened to the vertical.

The magnetic observations made over Anomalies 30/57 and 32/57 in the moraine-covered section were completely featureless. Vague trends, increasingly negative towards the open-cut, were measured in the self-potential survey but the readings were too erratic to be reliable.

Two small electromagnetic indications, Anomalies 27/57 and 33/57, were located south-west of the open-cut.

Anomaly 33/57 is a well-defined anomaly which continues south-west from the pyrite lode exposed in the face of the open-cut. The anomaly has been adequately tested by D.D.H. No.28, which intersected a mineralized zone containing mainly pyrite and 0.1 per cent copper.

Anomaly 27/57 is just south of a small breccia formation. This anomaly corresponds to equipotential Zone 27 and has also been tested by drilling (D.D.H. 30). This showed that the indication is due to pyrite mineralization containing about 0.5 per cent copper.

D. Conclusions and Recommendations.

The Turam technique was the only effective geophysical method used in the Comstock area. Several anomalous zones denoting areas of high electrical conductivity were located in the chloritic and sericitic schists adjoining, and within, the Comstock Fault crush zone. Four indications, Anomalies 27/57, 30/57, 32/57 and 33/57, are considered to be due to sulphide mineralization; the remaining anomalies are due to surface features such as railway tracks, pipe lines and pyritic mullock dumps.

The two smaller indications, Anomalies 27/57 and 33/57, are situated south-west of the Comstock open-cut and have been previously tested by diamond drill holes No.30 and No.28 respectively. Assays of the drill cores disclose that the holes intersected pyrite mineralization containing low copper values. The zones each cover only a small area and the testing which has been done is considered to be adequate.

Investigations over the area covered by glacial drift, north-east of the workings, revealed two anomalies which warrant further examination. These highly conductive zones, 30/57 and 32/57 are superimposed on a broad zone which shows a slight increase in conductivity above that of the unaltered Dundas sediments.

The geophysical results show Anomaly 30/57 as a lenticular feature about 700 feet in length, with an easterly strike, and a northerly dip. The indication is about 200 feet north of the Tasman shaft and is attributed to the main copper lode shown in Conolly's section on Plate 5E. As the mine workings are now inaccessible, further evaluation of the lode could best be carried out by diamond drilling from the surface. Considerable difficulty was experienced in earlier attempts to drill inclined holes through the unconsolidated glacial drifts and if drilling of an inclined hole is impossible, a vertical hole is recommended at Comstock co-ordinates 6300N/480W to test Anomaly 30/57. The selection of this site has been influenced by Conolly's interpretation that the body dips to the north. A second vertical drill hole at 6280N/250W is recommended to test the eastern end of the anomaly.

Anomaly 32/57 is interpreted as being due to a near vertical body extending with an irregular, but generally easterly strike from the Comstock open-cut to traverse 0, a distance of about 1,200 feet. The indication is considered to be due to the galena lode which lies on the western continuation of this anomaly (Plate 5E). The limited width of the lode, which is between 5 and 30 feet at the 134-foot level, makes the selection of a site for a vertical drill hole extremely difficult. The records state that the dip below the 134-foot level is to the south but the deviation from the vertical is slight. Consideration should be given to underground drilling from the old Tasman workings if access can be made from the Tasman shaft.

It is recommended also that two shallow holes be drilled through the moraine cover on traverses 4 and 6 to examine possible extensions of the mineralization.

6. ACKNOWLEDGMENTS

The willing and ready co-operation of the staff of the Mt.Lyell Mining and Railway Company, and in particular the assistance of the Chief Geologist, Mr. M.L. Wade, is gratefully acknowledged.

7. REFERENCES

ALEXANDER, J.M., 1953 - Ore Deposits of Australia. Geology of the Mt.Lyell Field. 5th Emp. Min. & Met. Congr., 1129-1144.

BLAINEY, G., 1953 - The Peaks of Lyell.

BRADLEY, J., 1956 - The Geology of the West Coast Range of Tasmania. Pt.II. Structure and Ore Deposits. Univ. Tas. Pub. 112.

CAREY, W.S., 1953 - Ore Deposits of Australia. The Geological Structure of Australia in Relation to Mineralization. 5th Emp. Min. & Met. Congr., 1108-1128.

CONOLLY, H.J. - Ore Deposits of Australia. 5th Emp. Min. & Met. Congr., 1137

HEDSTROM, H., 1940 - Phase Measurements in Electrical Prospecting. Trans. A.I.M.M.E., 138.

HILLS, L., 1914 - The Jukes-Darwin Mining Field. Dept. Mines, Tas., Bull. 16.

NYE, P.B., 1925 - The Tasman and Crown Lyell Extended Mine, Comstock. Dept. Mines, Tas. (Unpublished).

RICHARDSON, L.A., 1949 - Progress Report on Geophysical Surveys at Mt.Lyell, Queenstown, Tas. Bur.Min.Resour.Aust., Records 1949/28.

ROWSTON, D.L., 1957 - Geophysical Survey at Mt.Lyell (Corridor and Glen Lyell Areas), Queenstown, Tasmania. Bur.Min. Resour. Aust., Records 1957/50.

WADE, M.L., 1955 - Geological Reports on Great Lyell and East Darwin Areas (Unpublished Company Reports).

WEBB, J.E., 1949 - Geophysical Survey at Mt.Lyell, Queenstown, Tasmania, Bur. Min. Resour. Aust., Records 1958/111.


PLATE I
GORMANSTON
CONGLOMERATE
COPPER ESTATES
SCHIST
BLOW OPEN CUT
OWEN CONGLOMERATE
LYELL BLOCKS
NORTH LYELL
CROWN LYELL
LYELL THARSIS
ROYAL THARSIS
RAZORBACK
WEST LYELL
OPEN CUT
WORKSHOPS
MOUNT LYELL
COMSTOCK OPEN CUT
TASMAN AND CROWN LYELL EXTENDED
COMSTOCK AREA 1957
QUEEN LYELL
NORTH CROWN LYELL
ANACONDA
CORRIDOR AREA 1955/56
GLEN LYELL
GLEN LYELL AREA 1955/56
LYELL RESERVE
GREAT LYELL AREA 1957
Mt. Lyell grid coordinates 13780.51 S. 845.09 E.
Mt. Lyell Grid
GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA,
GEOPHYSICAL ANOMALIES AND LOCATION OF AREAS
GEOLOGY AFTER MT. LYELL M.& R. CO. LTD. PLAN No GE 10
APPROXIMATE SCALE IN FEET
500 0 500 1000 1500
Geophysical Anomaly Zones 1-30,+A-C Blazey and Douglas (1934-38)
Gormanston Geophysical Anomalies B.M.R. (1948-49), see Dwg. No. G 26-3
Geophysical Anomalies B.M.R. (1955-57)
GEOPHYSICIST
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26-22A

LEGEND

SEDIMENTARY ROCKS

QUATERNARY

- Q — Talus, alluvium etc.
- Qp — Moraine with varved clays.

ELDON GROUP — SILURIAN

- Sf — Florence Quartzite: fine grained & grey-brown.
- Sk, Skq — Keel: sandy shale & shaley sandstone with locally a major quartzite & shaley limestone.
- Sa, l — Amber Shales: blue-grey shales with limestone lenses.
- Sc, s — Crotty Quartzite: grey, medium to coarse grained, locally split by shales.

JUNEE GROUP — ORDOVICIAN

- Og — Gordon Limestone, dark blue-grey, argillaceous.
- Oo, Oou — Upper Owen Conglomerate
- Oom — Middle Owen Conglomerate
- Ool — Lower Owen Conglomerate

DUNDAS GROUP — CAMBRIAN

- €, c — Greywacke Conglomerate
- s — Miners Slate: finely banded siltstones
- ss — Grey sandstone
- v — Battery Volcanics: lavas, tuffs & agglomerates.
- € — Undifferentiated: variable greywacke sediments & volcanics, usually too metamorphosed or weathered for identification.

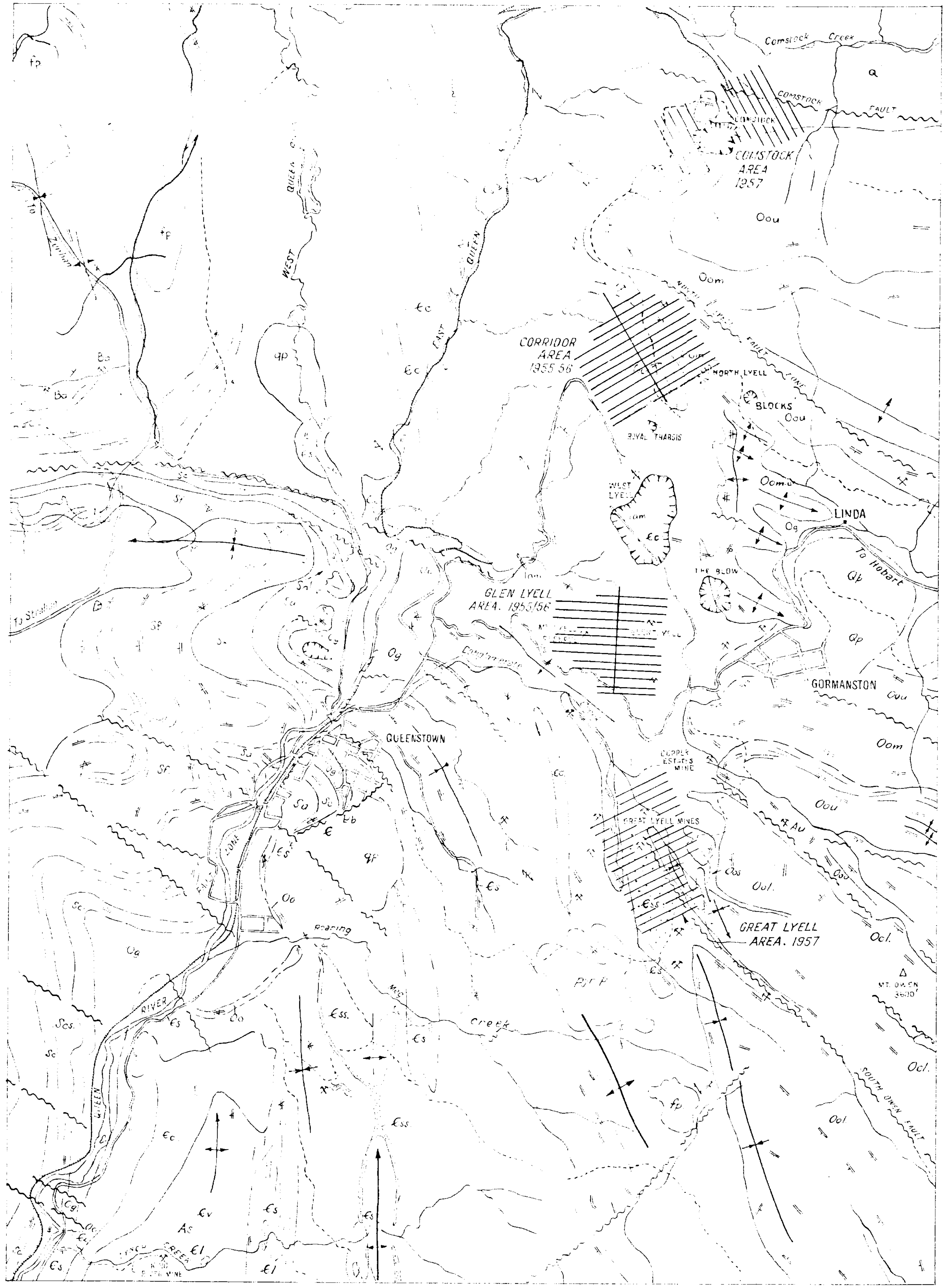
METAMORPHIC ROCKS

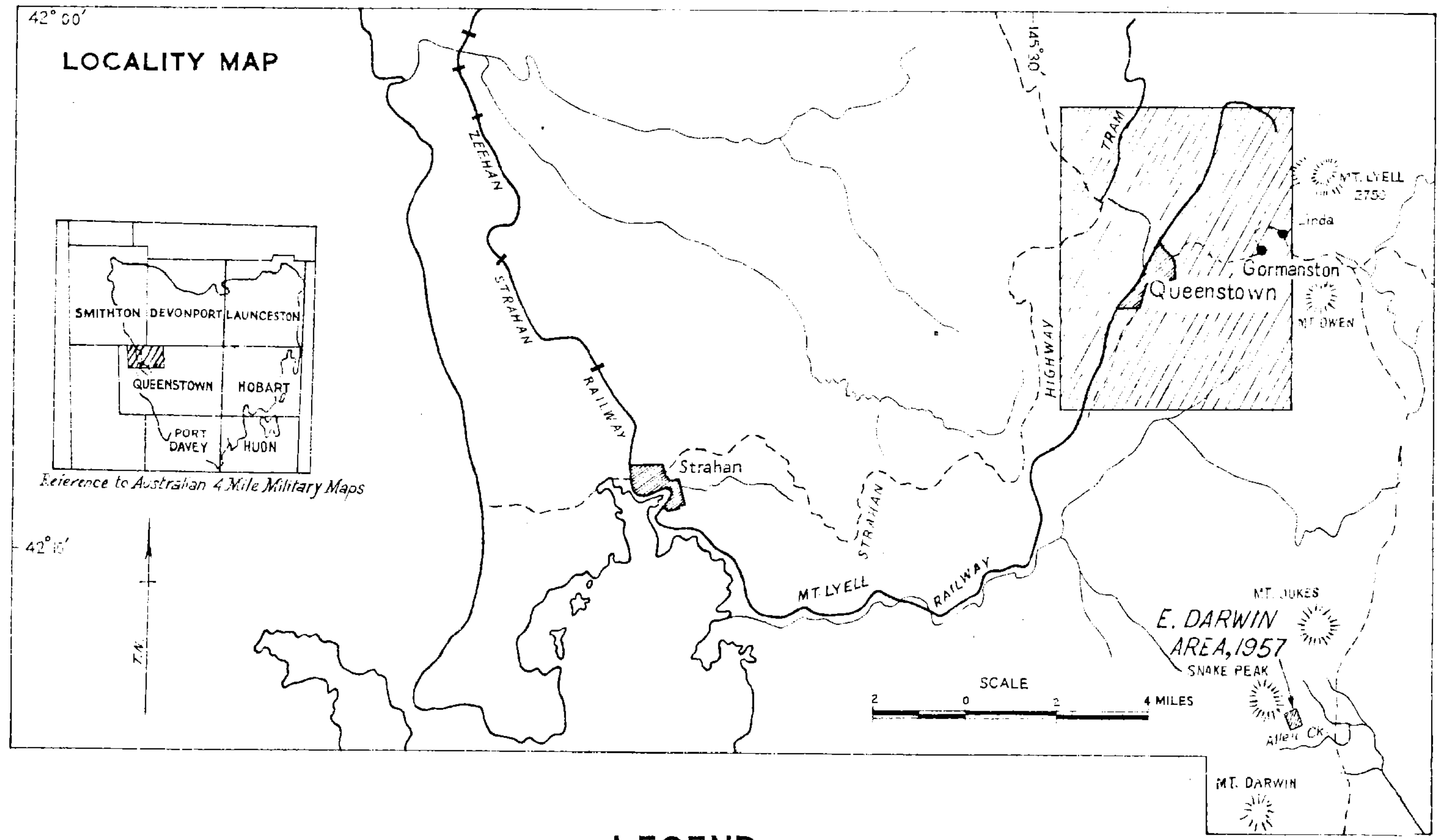
(ex Dundas Group)

- qp — Quartz felspar porphyry
- pyr p — Pyroxene felspar porphyry
- fp — Felspar porphyry mainly in the albitised area west of Cape Horn.

IGNEOUS ROCKS

- lam — Lamprophyre (kersantite?) dykes (post-Permian)
- €l — Lavas of the Dundas Group, mainly pyroxene basalt in the Lynchford area





LEGEND

GEOLOGICAL BOUNDARIES

- Observed
- Approximate

FAULTS

- Observed
- Approximate

BEDDING

- Strike & Dip
- Vertical
- Horizontal
- Overturned
- Pitch
- Schistosity
- Cleavage

- Syncline
- Anticline
- Quarry
- Mine For Copper
- Unless Marked — Au. Gold, Ba. Barytes, Pb. Galena
- As. Asbestos
- Main Road
- Vehicular Track
- Foot Track
- Railway Or Tramway
- River Or Creek
- Geophysical Traverses

GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA

GEOLOGICAL MAP

AFTER MT. LYELL M&R CO. LTD, QUEENSTOWN AREA GEOLOGICAL MAP

SCALE IN MILES

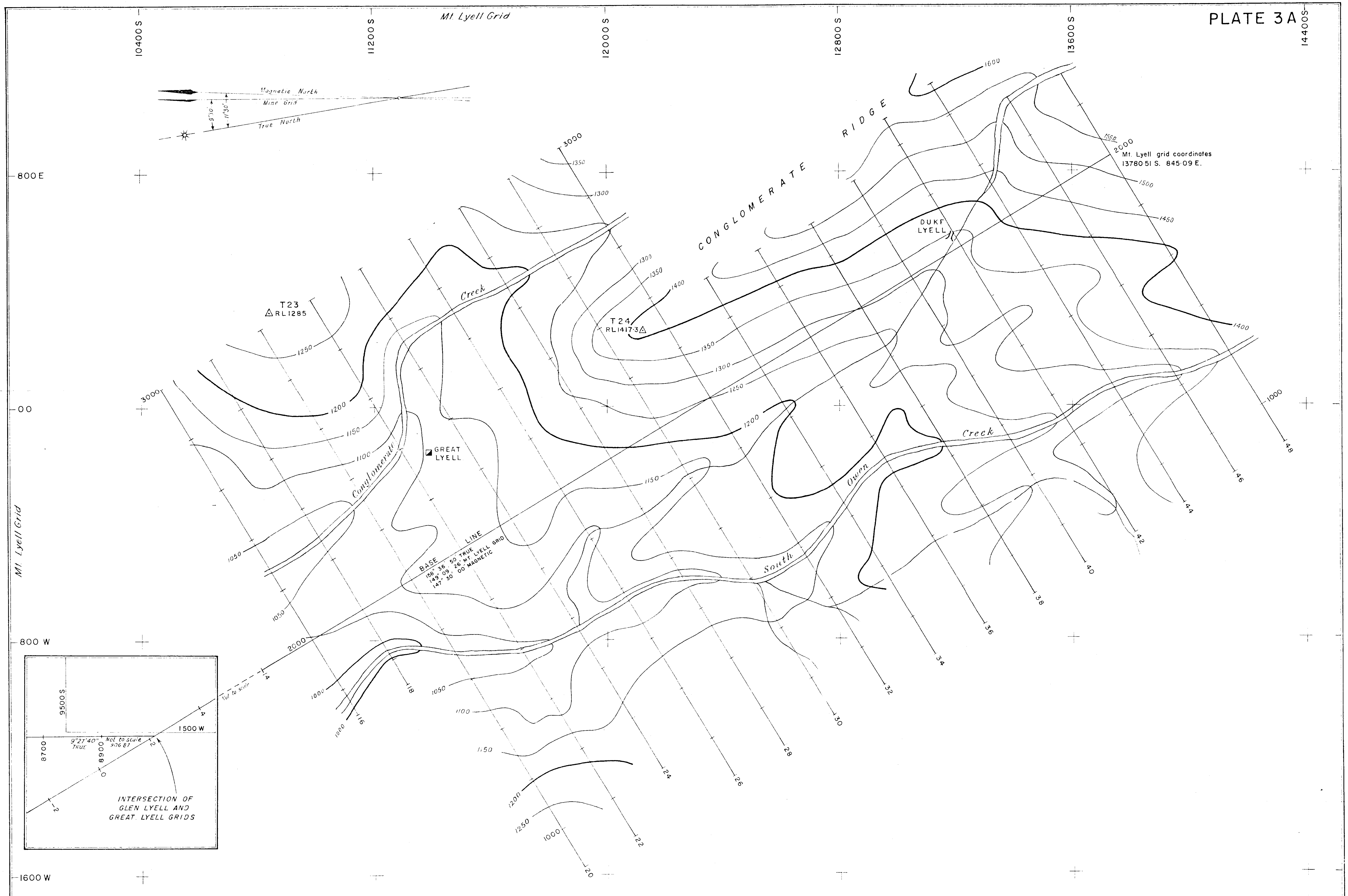
1 ¾ ½ ¼ 0 1 2

T.N. M.N.

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G26-31

To Accompany Records 1959, N°36

PLATE 3A



LEGEND

GEOPHYSICAL TRAVERSE

SHAFT

ADIT

SCALE IN FEET

200 150 100 50 0 200 400 600 800

CONTOUR INTERVAL 50 FEET

SURVEYING BY D.P. COOK DEPARTMENT OF INTERIOR CANBERRA A.C.T.

GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA GREAT LYELL AREA

GEOPHYSICAL GRID AND TOPOGRAPHY

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26-47

To Accompany Records 1959, No 36

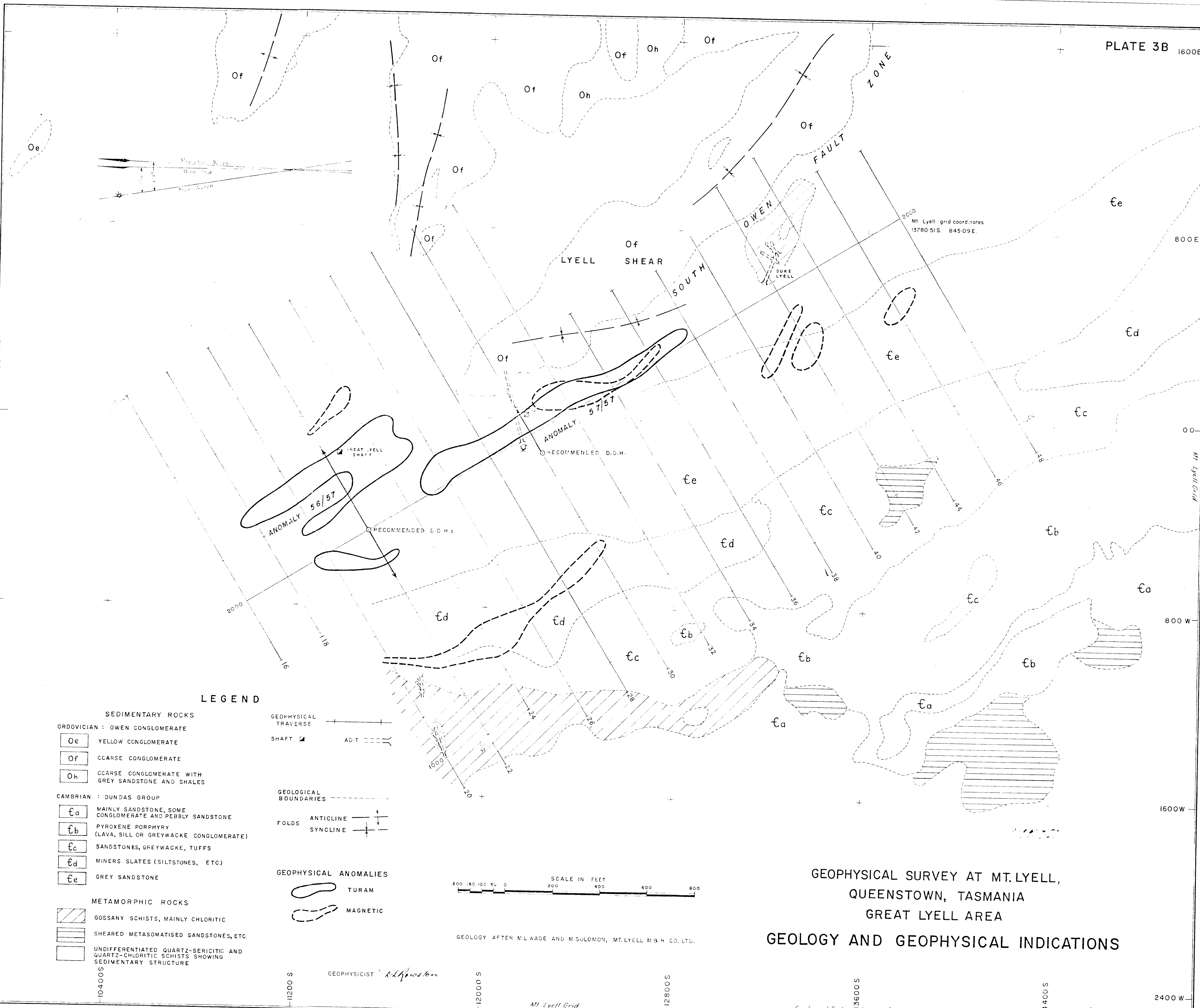
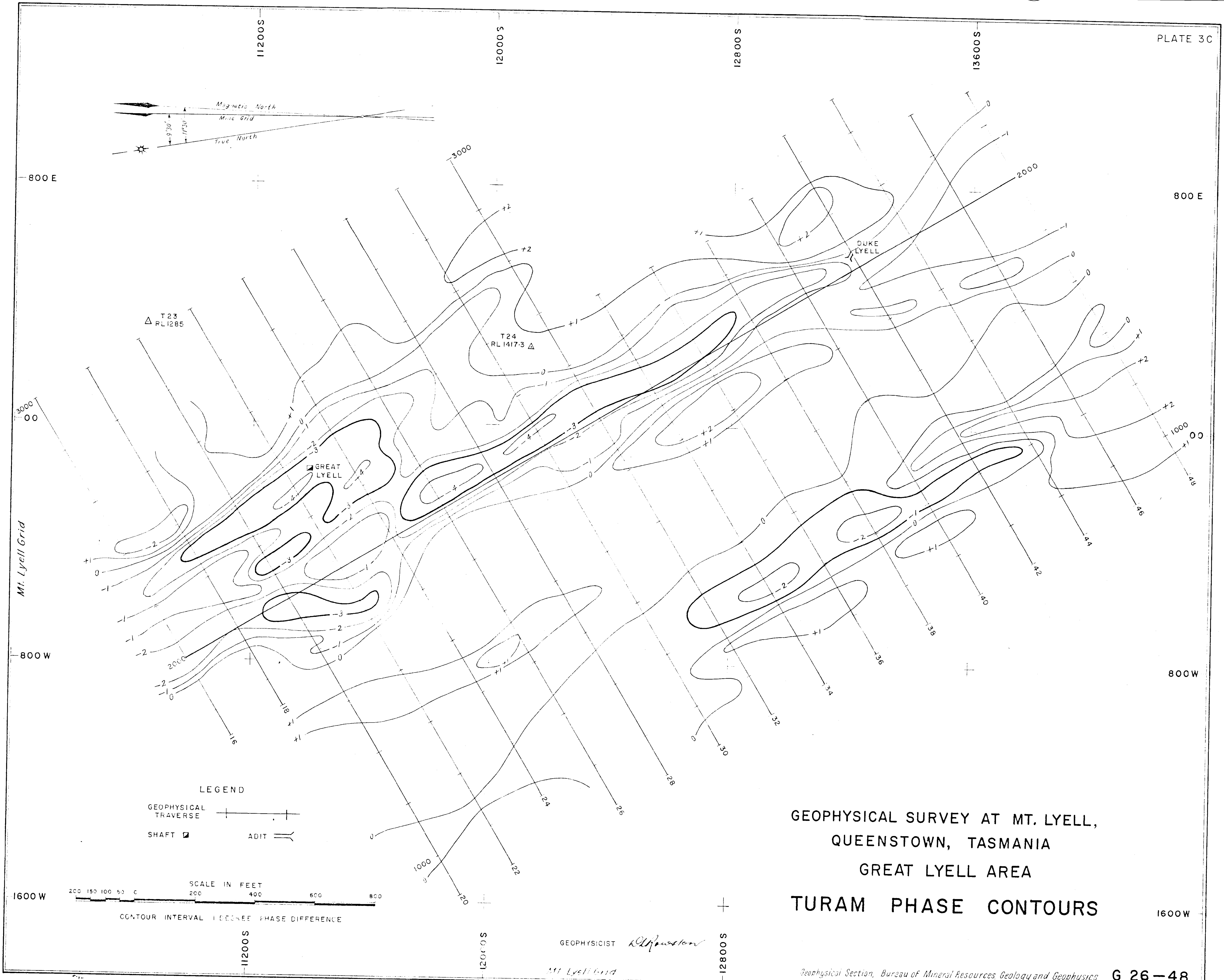


PLATE 3B
1600E
800E
00
800 W
1600W
2400 W
10400S
11200 S
12000 S
12800S
13600S
14400S
Mt. Lyell Grid
Of
Oh
Oe
€a
€b
€c
€d
€e
LYELL SHEAR
SOUTH OWEN FAULT ZONE
Mt. Lyell grid coordinates
13780·51S. 845·09E.
DUKE LYELL
GREAT LYELL SHAFT
ANOMALY 56/57
ANOMALY 57/57
RECOMMENDED D.D.H.
RECOMMENDED D.D.H.s
2000
1000
16
118
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
LEGEND
SEDIMENTARY ROCKS
ORDOVICIAN : OWEN CONGLOMERATE
Oe YELLOW CONGLOMERATE
Of COARSE CONGLOMERATE
Oh COARSE CONGLOMERATE WITH GREY SANDSTONE AND SHALES
CAMBRIAN : DUNDAS GROUP
€a MAINLY SANDSTONE, SOME CONGLOMERATE AND PEBBLY SANDSTONE
€b PYROXENE PORPHYRY (LAVA, SILL OR GREYWACKE CONGLOMERATE)
€c SANDSTONES, GREYWACKE, TUFFS
€d MINERS SLATES (SILTSTONES, ETC.)
€e GREY SANDSTONE
METAMORPHIC ROCKS
GOSSANY SCHISTS, MAINLY CHLORITIC
SHEARED METASOMATISED SANDSTONES, ETC.
UNDIFFERENTIATED QUARTZ-SERICITIC AND QUARTZ-CHLORITIC SCHISTS SHOWING SEDIMENTARY STRUCTURE
GEOPHYSICAL TRAVERSE
SHAFT
ADIT
GEOLOGICAL BOUNDARIES
FOLDS ANTICLINE
SYNCLINE
GEOPHYSICAL ANOMALIES
TURAM
MAGNETIC
SCALE IN FEET
200 150 100 50 0 200 400 600 800
GEOLOGY AFTER M.L.WADE AND M.SOLOMON, MT. LYELL M.& R. CO. LTD.
GEOPHYSICIST
GEOPHYSICAL SURVEY AT MT. LYELL,
QUEENSTOWN, TASMANIA
GREAT LYELL AREA
GEOLOGY AND GEOPHYSICAL INDICATIONS
Geophysical Section, Bureau of Mineral Resources Geology and Geophysics
G 26-46



GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA
GREAT LYELL AREA
TURAM PHASE CONTOURS

GEOPHYSICIST

Mt. Lyell Grid

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26—48

To Accompany Records 1950 No. 38

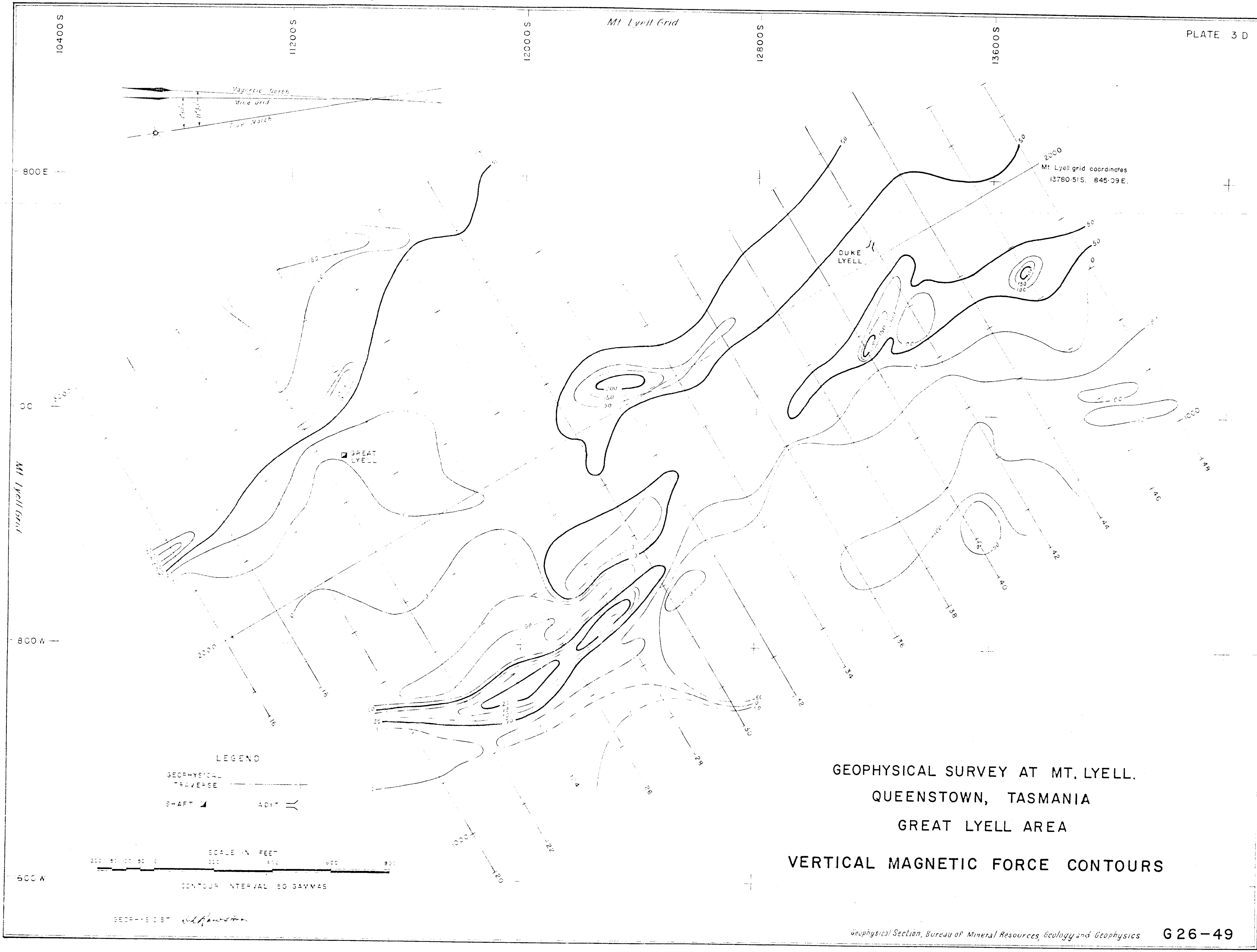


PLATE 3 D
Mt. Lyell Grid
10400 S
11200 S
12000 S
12800 S
13600 S
800 E
00
800 W
1600 W
Mt Lyell Grid
Magnetic North
Mine Grid
True North
Mt. Lyell grid coordinates
13780·51 S. 845·09 E.
DUKE LYELL
GREAT LYELL
LEGEND
GEOPHYSICAL TRAVERSE
SHAFT
ADIT
SCALE IN FEET
CONTOUR INTERVAL 50 GAMMAS
GEOPHYSICIST
GEOPHYSICAL SURVEY AT MT. LYELL.
QUEENSTOWN, TASMANIA
GREAT LYELL AREA
VERTICAL MAGNETIC FORCE CONTOURS
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics
G26–49

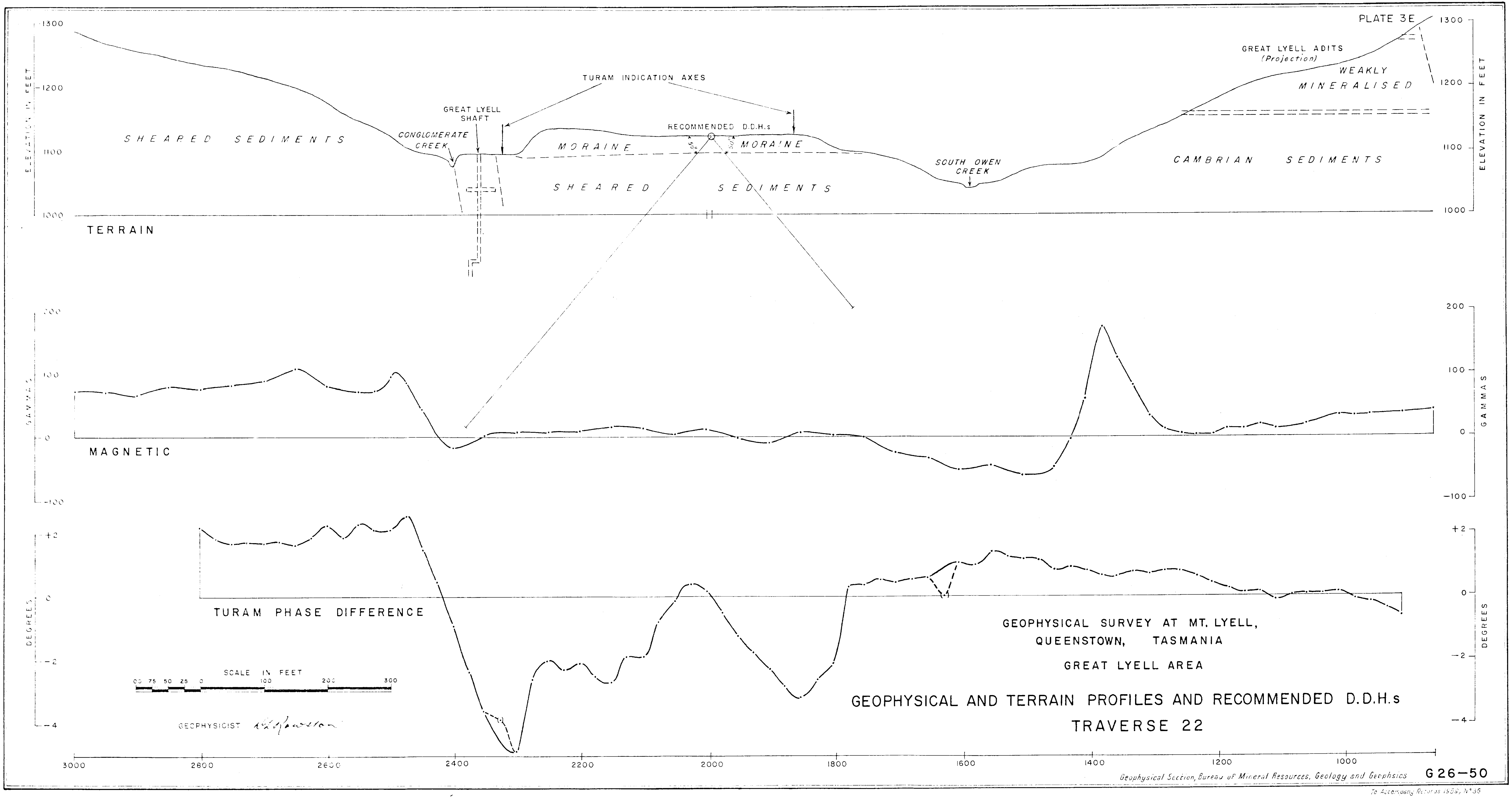
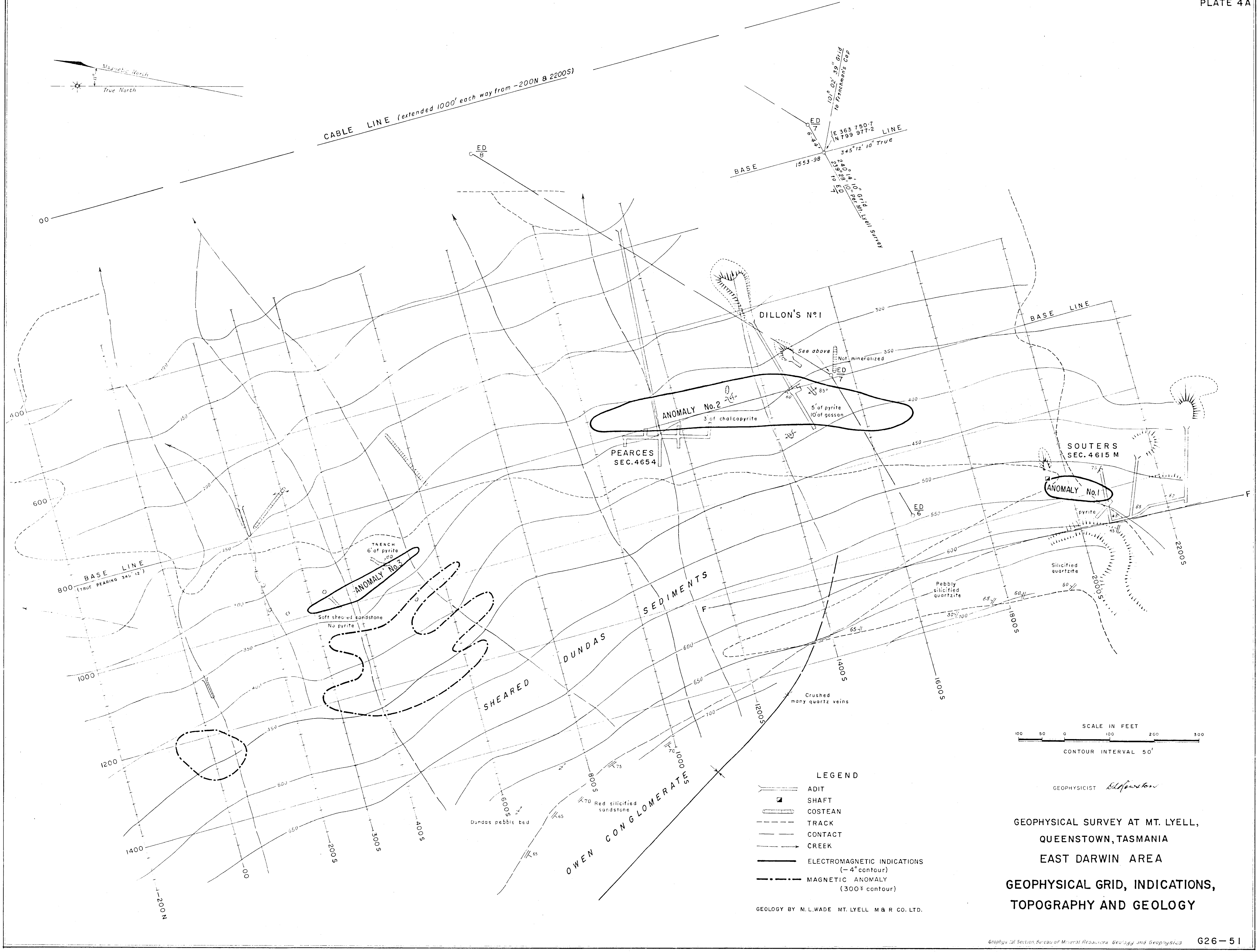
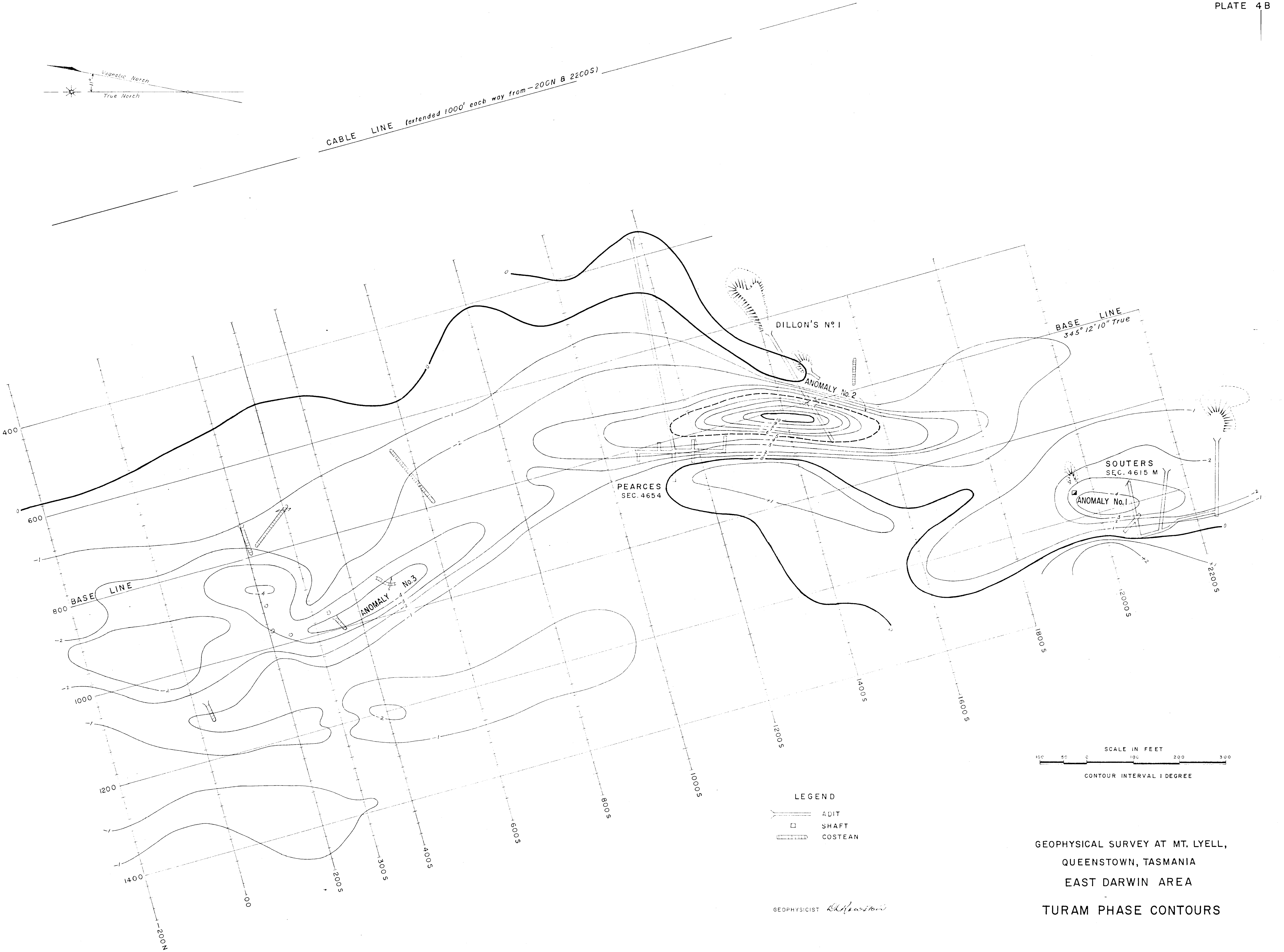


PLATE 3E
TERRAIN
ELEVATION IN FEET
1300
1200
1100
1000
SHEARED SEDIMENTS
CONGLOMERATE CREEK
GREAT LYELL SHAFT
TURAM INDICATION AXES
RECOMMENDED D.D.H.s
MORAINE
MORAINE
SHEARED SEDIMENTS
SOUTH OWEN CREEK
GREAT LYELL ADITS (Projection)
WEAKLY MINERALISED
CAMBRIAN SEDIMENTS
MAGNETIC
GAMMAS
200
100
0
-100
TURAM PHASE DIFFERENCE
DEGREES
+2
0
-2
-4
SCALE IN FEET
100 75 50 25 0 100 200 300
GEOPHYSICIST
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA
GREAT LYELL AREA
GEOPHYSICAL AND TERRAIN PROFILES AND RECOMMENDED D.D.H.s
TRAVERSE 22
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics
G 26—50
To Accompany Records 1953, N° 36

PLATE 4A


Magnetic North
True North
CABLE LINE (extended 1000' each way from -200N & 2200S)
10°02' 39" Grid
To Frenchman's Cap
E 363 750·7
N 799 977·2
BASE LINE
345°12' 10" True
1553·98
240°14' 10" Grid
239°28' 10" Per Mt. Lyell Survey
to ED 7
ED 7
ED 8
ED 6
DILLON'S No 1
See above
Not mineralized
ANOMALY No. 2
3' of chalcopyrite
5' of pyrite
10' of gossan
PEARCES
SEC. 4654
SOUTERS
SEC. 4615 M
ANOMALY No. 1
pyrite
TRENCH
6' of pyrite
ANOMALY No. 3
Soft sheared sandstone
No pyrite
BASE LINE
(TRUE BEARING 345°12')
SHEARED DUNDAS SEDIMENTS
OWEN CONGLOMERATE
Silicified quartzite
Pebbly silicified quartzite
Crushed
many quartz veins
Red silicified sandstone
Dundas pebble bed
F
F
00
400
600
800
1000
1200
1400
-200N
-00
200S
300S
400S
600S
800S
1000S
1200S
1400S
1600S
1800S
2000S
2200S
SCALE IN FEET
100 50 0 100 200 300
CONTOUR INTERVAL 50'
LEGEND
ADIT
SHAFT
COSTEAN
TRACK
CONTACT
CREEK
ELECTROMAGNETIC INDICATIONS (-4° contour)
MAGNETIC ANOMALY (300γ contour)
GEOLOGY BY M.L.WADE MT. LYELL M & R CO. LTD.
GEOPHYSICIST
GEOPHYSICAL SURVEY AT MT. LYELL,
QUEENSTOWN, TASMANIA
EAST DARWIN AREA
GEOPHYSICAL GRID, INDICATIONS,
TOPOGRAPHY AND GEOLOGY
G26-51



GEOPHYSICAL SURVEY AT MT. LYELL,
QUEENSTOWN, TASMANIA

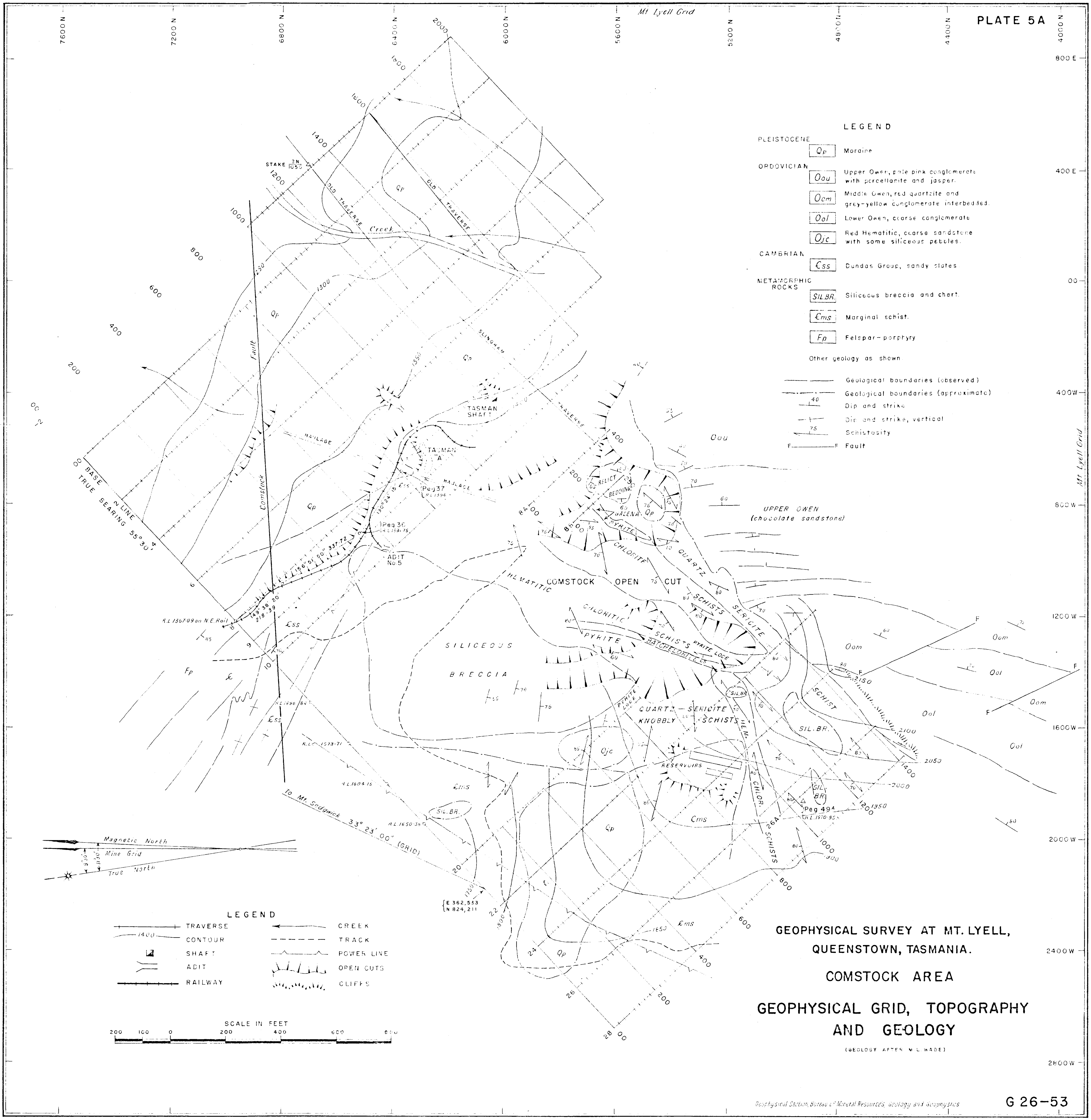
EAST DARWIN AREA

TURAM PHASE CONTOURS

GEOPHYSICIST

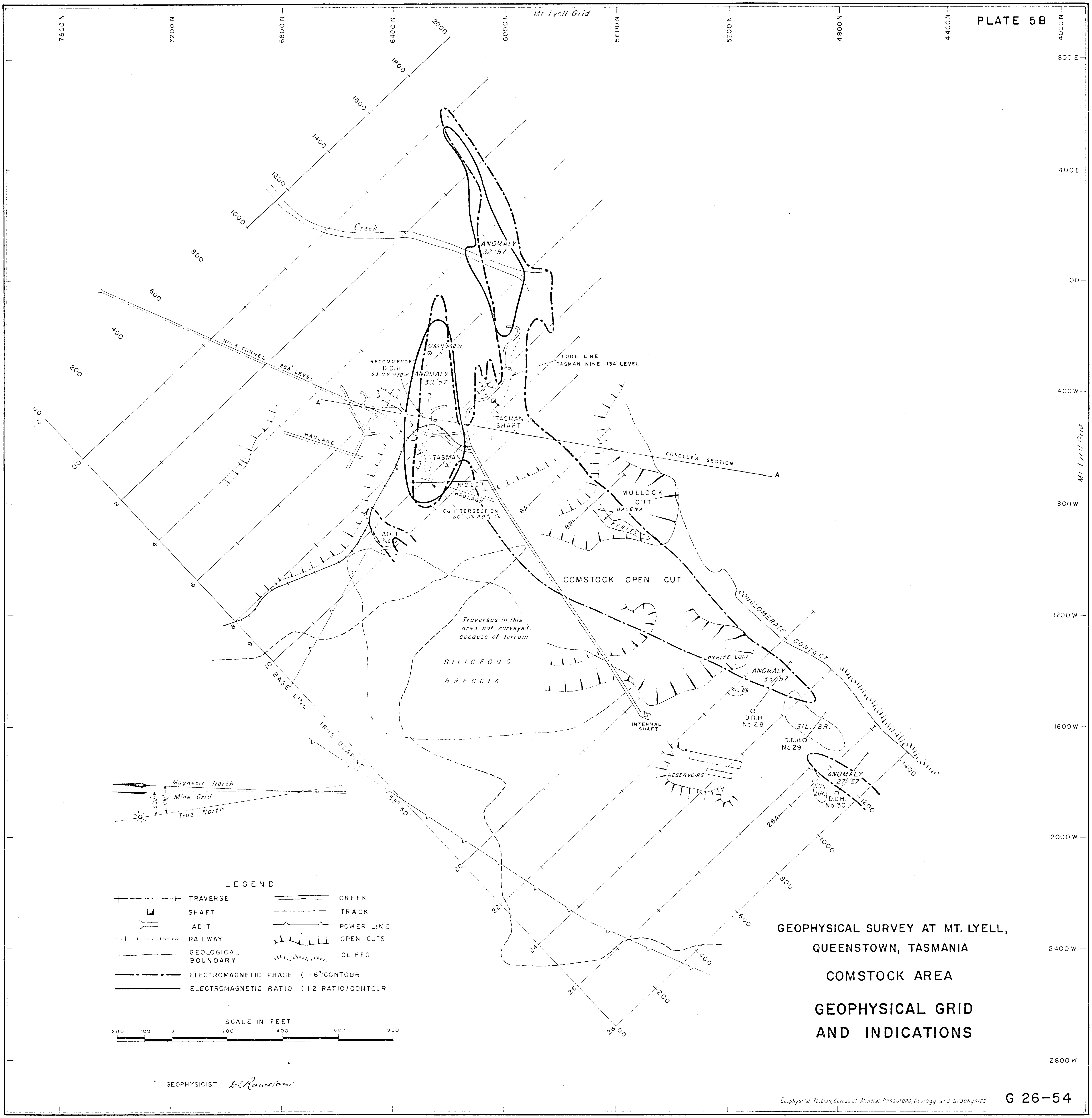
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26-52

To accompany Records 1954, No. 56



To Accompany Records 1959, N° 30

PLATE 5B



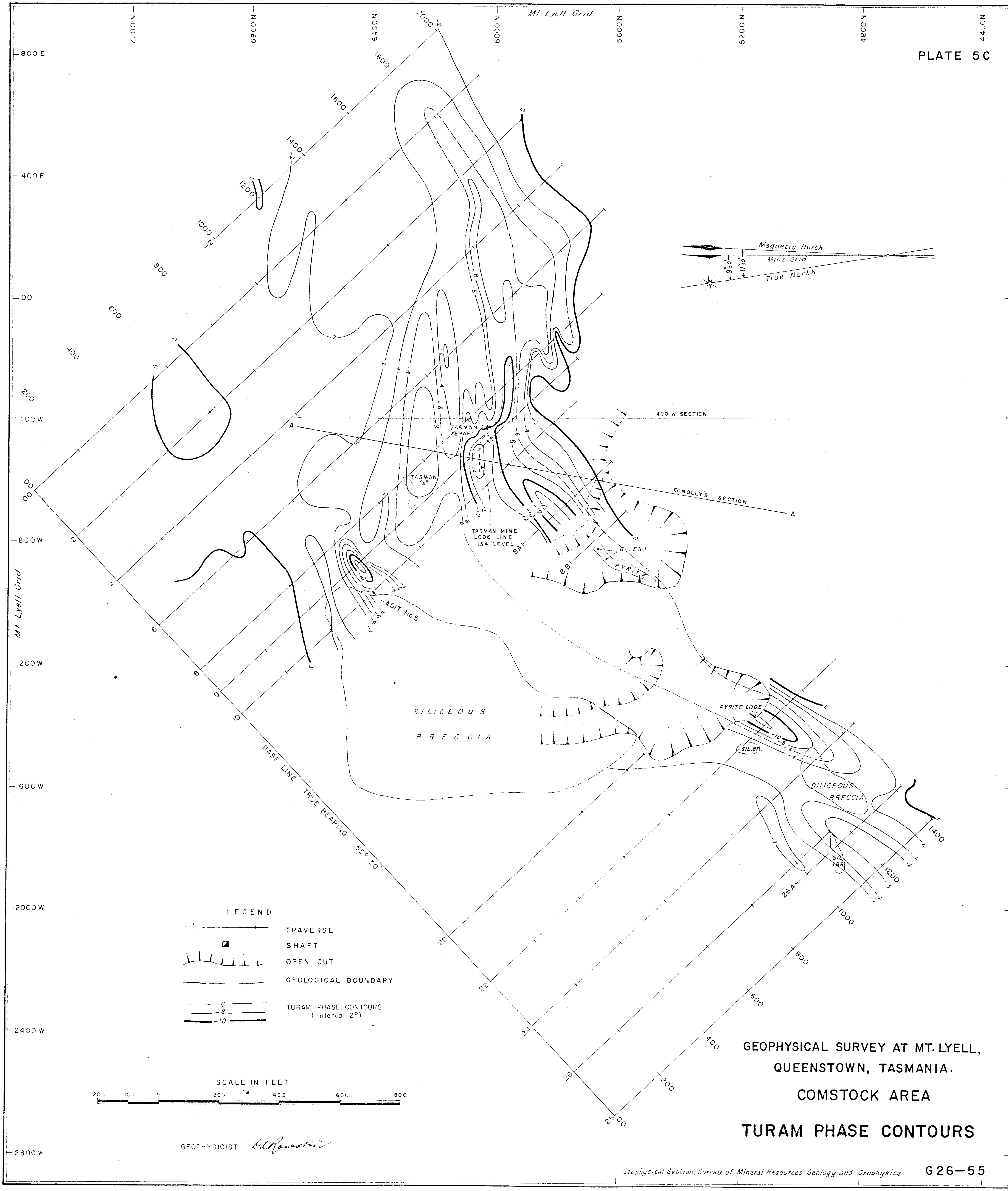
GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA

COMSTOCK AREA

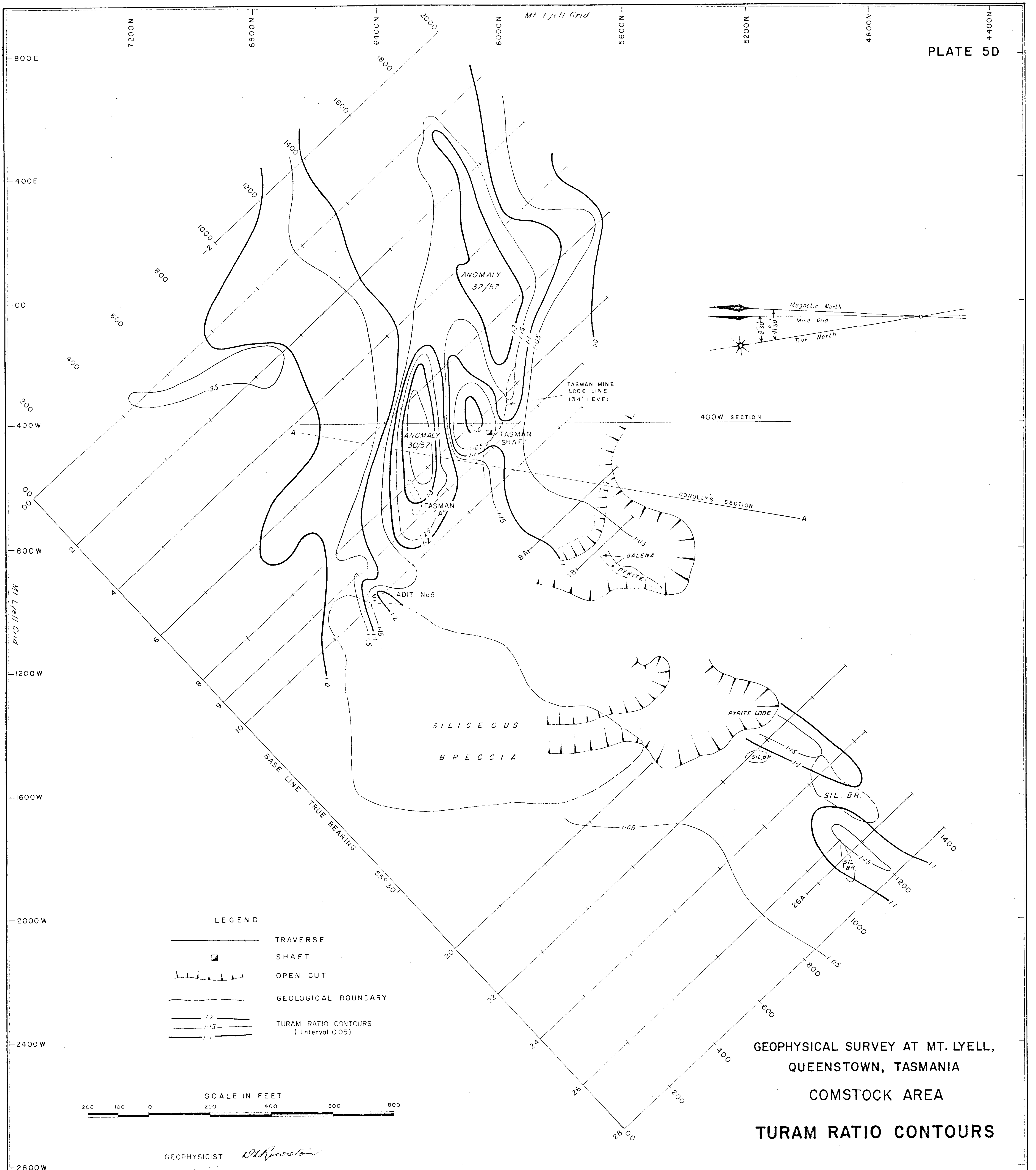
GEOPHYSICAL GRID AND INDICATIONS

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics

G 26-54



To Accompany Records 1959, Nº 36



GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA

COMSTOCK AREA

TURAM RATIO CONTOURS

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G26—56

To Accompany Records 1959, N°36

PLATE 5E
TURAM RATIO
RATIO
1·4
1·2
1·0
ZONE 30/57
ZONE 32/57
TURAM PHASE DIFFERENCE
PHASE DEGREES
0
-4
-8
-12
-16
Profile due to ore body.
SECTION A—A
(AFTER CONOLLY)
6300N/480W
INDICATION AXIS
6000 N
Top of Bornite Lode
GALENA LODE
134' Level
253' Level
Drill Hole
Recommended
SCHIST
CONGLOMERATE
GEOPHYSICIST
DUNDAS SEDIMENTS
HORIZONTAL SCALE IN FEET
100 75 50 25 0 100 200 300 400
R.L.1000
TURAM RATIO
TURAM PHASE DIFFERENCE
Effect of dumps?
SECTION ALONG 400 W (MT. LYELL GRID)
(AFTER MT. LYELL GEOLOGICAL DEPARTMENT)
Porcellanite and jasper in rose pink conglomerate
6250N/230W
TASMAN SHAFT
Ore pitching East
SCHIST
CONTACT
UPPER OWEN CONGLOMERATE
SLATE BANDS
VOLCANIC
GALENA LODE
HARD FLINTY QUARTZITE
Recommended Drill Hole
DUNDAS GROUP
COMSTOCK FAULT ZONE
R.L.1000
GEOPHYSICAL SURVEY AT MT. LYELL, QUEENSTOWN, TASMANIA
COMSTOCK AREA
TURAM PROFILES AND SECTIONS ALONG A-A AND 400 W
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics
G 26-57